

**PLAN OF WORK  
FY 2000 REPORT OF ACCOMPLISHMENTS AND  
RESULTS**

**ARKANSAS AGRICULTURAL EXPERIMENT STATION  
DIVISION OF AGRICULTURE  
UNIVERSITY OF ARKANSAS**

**March, 2001**

## **FY 2000 Annual Report of Accomplishments and Results**

### **Introduction**

The Arkansas Agricultural Experiment Station is the research arm of the Division of Agriculture, University of Arkansas system. The FY 2000 Annual Report of Accomplishments provides the necessary elements identified in the guidelines. For purposes of this reporting the 10 program areas identified in the Plan of Work submission under the five national goals have been condensed into the original five goals. Only selected key themes and specific examples have been included in this annual report and as such represent only a small cross section of our total programs.

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### **PLANNED PROGRAMS**

**Goal 1 An agricultural production system that is highly competitive in the global economy**

**Program Area 1. Sustainable plant and animal production systems**

#### **Plant systems**

Arkansas continues to be the largest producer of rice in the nation and remains a major producer of soybeans, cotton, and soft red winter wheat. Fruits, vegetables and ornamentals remain a small but growing part of the agricultural economy. Row crop farmers remain at risk due to high input costs and low prices. Integrated research and extension teams continue to focus on developing improved crop production systems that are as efficient and cost effective as possible.

The University of Arkansas has made strategic investments in new personnel with a focus on row crop production systems. One individual concentrates on rice production systems while another will concentrate on cotton. These scientists will serve to integrate current knowledge to maximize efficiency and help to identify knowledge gaps that will need to be addressed by multi-disciplinary research teams. Additional capacity has been added in plant biotechnology with a focus on plant functional genomics particularly rice. The rice

genomics program has been established as a joint university, USDA, ARS effort with research scientists at the USDA Rice Germplasm Center.

## **Animal Systems**

Beef and poultry production remain closely linked in Arkansas. Most beef operations are small in size and often are co-located with poultry production with poultry litter being used as a fertilizer source for pastures. Animal waste management and potential nutrient runoff from pasture lands remain as significant challenges. A coordinated effort is underway to address phosphorus runoff and minimize potential impact on water quality. A new swine research unit is under construction that will address animal waste issues in addition to research aimed at improving production efficiency. In collaboration with USDA, ARS and the University of Missouri, station scientists have developed new endophyte infected fescues that do not cause fescue toxicosis but that retain the desired features of endophyte infected grasses. Multi-state field trials are underway and commercialization agreements are under development.

In poultry, the University of Arkansas works closely with the poultry industry to maximize production efficiency, and address issues related to poultry health, food safety and waste management. Through the Poultry Center of Excellence, multi-disciplinary teams conduct basic research on poultry biology and genetics, nutrition, poultry health, and food safety. A new genomics core facility has been developed within the Center to better address genetic studies in poultry as well as serve as a resource to other plant and animal programs in molecular biology.

## **Agricultural Economics**

In agricultural economics and agribusiness, station scientists have focused on addressing the need to maximize farm profitability and minimize risk during this period of low commodity prices and high input costs. Through redirection of state funds, additional capacity will be added to several research and extension centers throughout the state to address farm level needs in economics. This is part of a joint extension, research effort to address immediate needs by the farm community. Collaborations continue with the University of Missouri, Iowa State and Illinois in the area of economic policy and risk management. The global rice model continues to serve as a resource for the rice industry. A joint PhD program in agricultural economics is under development with Oklahoma State University.

## **Product Development, Processing and Engineering**

Through the Institute of Food Science and Engineering, station scientists are working directly with the food industry to address research needs in food processing and assist in the development of new uses for raw agricultural products. The institute provides matching grants for direct collaborations with food industry partners. A new program thrust is underway in functional foods in collaboration with USDA, ARS, LSU, and Oklahoma State

funded through the IFAFS grants program.

FY 2000 Expenditures on Goal 1: \$34,844,478.15

### **Key theme - Plant Germplasm**

Experiment station scientists continue to develop improved germplasm for rice, soybeans, cotton and wheat as well as spinach, southern peas, blueberries, blackberries, table grapes and peaches. Breeding lines are grown statewide and evaluated for yield, quality and pest resistance. Disease nurseries are maintained for specialized evaluations such as for soil borne viruses on wheat and for soybean diseases. For crop plants such as rice, management inputs such as fertility are determined prior to variety release so that farmers are familiar with the management needs prior to use.

Impact - New varieties of rice, soybean, wheat, grapes and peaches were released for use by producers. Basic research on drought tolerance by soybeans has identified germplasm with improved drought tolerance that will be incorporated into the variety development program.

Source of federal funds - Hatch, state matching

Scope of Impact - Multistate integrated research and extension. Most breeding materials have broad utility across the mid-South as well as other locations. For instance, new table grape varieties are widely grown in the South, Midwest and East as well as internationally.

### **Key theme - Plant genomics**

After a multi-year series of studies, additional faculty capacity has been added to address plant genomics particularly rice genomics. A joint USDA, state AES rice functional genomics research program has been formed to specifically address improvement of rice through biotechnology focusing on key areas such as quality and pest resistance.

Impact - Several new genes for pest and disease resistance have been identified and incorporated into breeding lines for evaluation and incorporation into the breeding program. If successful, new varieties will have improved pest and disease resistance reducing the use of needed chemical controls.

Source of federal funds - Hatch, state matching

Scope of Impact - Multistate research in the rice producing states in the south (AR, MS, TX, LA)

### **Key theme - Plant production efficiency**

A significant portion of Arkansas soybeans are produced under dryland production systems. Hot, dry summer weather often remains a limiting factor to yield and profitability under non-irrigated production systems. Basic research on drought tolerance in soybeans has identified germplasm with greatly improved tolerance to drought. This germplasm has been introduced into high yielding breeding lines for further development into useful germplasm with improved drought tolerance.

Impact - Development of soybean germplasm with improved drought tolerance will improve the profitability of dryland soybean production systems throughout the South and minimize the risk of producing soybeans without irrigation.

Source of funds - Hatch, state matching

Scope of Impact - Multistate research. Soybean breeding lines often have broad utility across the South and useful germplasm is widely shared with other public and private breeding programs.

### **Key theme - Adding value to agricultural products**

The isoflavone genistin in soybeans is a precursor to genistein which has been shown to reduce heart disease and cancer. Commercial processing of soy into soy-based products high in genistein will add value to food products enriched with this health promoting compound. Arkansas food scientists have produced soy protein concentrates enriched with genistein that can be used in a variety of soy-based food products.

Impact- The development of food products high in genistein and other health promoting substances will increase market demand for these food products and for soybeans high in genistin. Increased use of soy products high in health promoting compounds can significantly impact on public health and development of soybean germplasm high in genistin will add value to the raw product.

Source of funds - Hatch, state matching

Scope of impact - multistate research

### **Key theme - Agricultural profitability**

Variable rate technology for fertilizer applications has the potential to reduce total input costs and increase farm profitability. A model of rice and soybean production was used to assess the profitability of variable rate phosphorus applications on a number of farm operations. Depending on soil type, variable rate technology had the potential to improve profitability by up to \$25 per acre.

Impact - Variable rate technology has the potential to increase farm profitability for large farm operations where the cost savings can overcome the cost of equipment or custom service.

Source of federal funds - Hatch, state matching

Scope of impact - multistate research and extension

### **Key theme - new uses**

Pectin is used in a variety of processed foods. Up to 5,000 tons of pectin are imported annually for use by the food industry. Currently soybean hulls and hypocotyls are low value byproducts of soybean processing and used primarily as poultry litter and animal feed. Work by food scientists has shown that pectin can be recovered from these low value byproducts and replace imported materials for use in processed foods.

Impact - Recovery of pectin from soybean hulls will add value to byproducts of soybean processing. Efficient recovery of pectin for use by the food industry can convert a low value byproduct to one in demand by the food industry.

Source of federal funds - Hatch, state matching

Scope of Impact - multistate research

### **Key theme - biobased products**

Plastic films used for food packaging and other uses are made from petroleum-based synthetic plastics. Biodegradable and edible films can be made from soy and other plant-based protein sources and used as alternatives for food packaging. Arkansas food scientists have developed biodegradable films from soy and other food proteins for use as packaging and coatings.

Impact - Use of food-based films can replace existing plastic films reducing demand for petroleum-based products and reducing the amount of material entering the solid waste stream for disposal.

Source of federal funds - Hatch, state matching

Scope of Impact - multistate research

### **Key theme - plant health**

The rice water weevil is a significant pest of rice reducing yield in infested fields and requiring the use of chemical pesticide to reduce infestations. Prediction of infestation is

difficult necessitating unnecessary insecticide applications on a preventative basis. Development of an effective weevil trapping device has led to the development of an effective monitoring system that can be used to predict infestations and potential damage. Establishment of threshold levels now allow accurate prediction of damage and use of insecticide treatments only as necessary.

Impact - The development of the weevil trap will provide producers with a cost effective tool for determining weevil populations and the need for insecticide treatment only as necessary. The monitoring device will reduce insecticide treatment costs and minimize the need for chemical treatments.

Source of federal funds - Hatch, state matching

Scope of Impact - multistate research and extension (AR, MS, LA, TX)

### **Key theme - animal production efficiency**

PCR testing of selected genetic traits in poultry breeder flocks can greatly reduce the cost and time required using conventional genetic testing. PCR-based tests have been developed that detect genes for feather color in poultry. When present these genes cause unwanted tissue pigmentation in poultry white meat which result in rejection of the meat during processing.

Impact - Use of PCR-based testing by the poultry breeders eliminates the need for test matings in breeding populations to eliminate these unwanted genes from genetic lines and decrease the incidence of tissue pigmentation in commercial broiler flocks.

Source of federal funds - Hatch, state matching

Scope of impact - multistate research

### **Key theme - animal health**

Fescue toxicosis in cattle is caused by toxic compounds produced by a fungus that naturally infests tall fescue, a common cool season pasture grass used throughout much of the U.S. The toxin results in calve mortality and reduces weight gain in cattle. The fungal endophyte provides drought and pest resistance to the grass so that removal of the endophyte results in poor pasture stands. A multi-disciplinary team of scientists have identified fungal strains that lack the compounds that cause cattle toxicosis but still retain the pest and drought resistance and have introduced these strains into improved fescue germplasm.

Impact - Release of fescue varieties that contain non-toxic endophytes will minimize the incidence of fescue toxicosis and resulting economic loss to cattle producers estimated at \$50 million annually.

Source of federal funds - Hatch, multi-state research funds, special grants program

Scope of impact - multistate research and extension (AR, MO)

## **Goal 2. A safe and secure food and fiber system**

Food safety continues to be of utmost concern to most consumers with periodic well publicized incidents maintaining a continual level of concern among consumers. Several product recalls have included Arkansas-based companies. The Food Safety Center within the Institute of Food Science and Engineering was created to focus multi-disciplinary research on food safety issues. The University of Arkansas has participated in a coordinated research effort with Kansas State and Iowa State as part of the Food Safety Consortium. Over the past decade consortium scientists have addressed major issues of the pork, beef and poultry industry related to food safety in a coordinated research effort. The University of Arkansas also is a charter member of the National Alliance for Food Safety and has served as the administrative center for the alliance since its inception. The university is in the process of creating teaching modules on food safety for use by the food industry regionally and nationally in collaboration with the poultry industry.

Expenditures for Goal 2: \$3,674,413.45

### **Key theme - food quality**

Functional foods are food products with enhanced health promoting properties due to the presence of anti-oxidants and other compounds shown to reduce the incidence of disease and enhance overall human health. Arkansas produces many of these crops shown to be high in these health promoting compounds such as blueberries, grapes, blackberries, spinach, and soybeans. A multi-disciplinary team are using biotechnology as well as conventional plant breeding to develop plant varieties with enhanced levels of these compounds and to retain these substances during storage and processing. Arkansas scientists have formed a research consortium with several institutions to address this opportunity.

Impact - Plant varieties and food products high in health promoting substances have the potential to improve overall public health and result in reduced medical costs in the U.S. population. Plant varieties and foods high in the substances will have a higher value.

Source of federal funds - Hatch, IFAFS, state matching

Scope of impact - A research consortium has been formed with LSU, Oklahoma and USDA, ARS to address functional foods.

### **Key theme - food safety**

Food safety remains a major concern for consumers despite the overall safety of our food system. Increasingly rapid, accurate tests for food-borne pathogens remain a priority due to the volume and rapidity of our food processing and handling system. Food safety researchers have modified existing tissue culture-based tests for Campylobacter reducing the time needed for laboratory testing by 2-3 days.

Impact - Campylobacter and other food borne pathogens remain as public health threats to our food supply. Improved testing allows food industry personnel to more rapidly detect potential contamination and make necessary corrections and improve diagnosis of food borne microbes by medical personnel.

Source of federal funds - Hatch, special grants program, state matching

Scope of impact - Multistate research. For a number of years the Food Safety Consortium composed of Arkansas, Kansas State and Iowa State have focused research efforts on food safety.

### **Key theme - food borne pathogen protection**

Food borne pathogens remain a significant threat to our food system and remain a major concern among consumers. The pathogen *Listeria monocytogenes* is a significant threat on cooked, ready to eat foods because the pathogen can grow during refrigerated storage. Food scientists have found natural microbial proteins called bacteriocins that inhibit *Listeria*. When coated onto chicken products they can inhibit the pathogen for up to 28 days in refrigerated storage.

Impact - The availability of an effective control for *Listeria* can save millions of dollars in product recalls and prevent the incidence of food borne illness in refrigerated foods.

Source of federal funds - Hatch, special grants program, state matching

Scope of impact - Multistate research. Researchers from Iowa State, Kansas State and the University of Arkansas have worked together to address food safety issues through the Food Safety Consortium. Their work has impacted the food industry and consumers nationally.

### **Goal 3. A healthy well nourished population**

Arkansas ranks high nationally as a state with significant nutrition related health problems linked to poor diet and obesity especially among under-served populations. The strong social aspects to this problem make this a difficult issue to address and Arkansas has made little progress on reducing diet related health problems. In order to focus on this important area, station scientists in nutrition have been relocated into the Institute of Food

Science and Engineering and the Department of Food Science. This will better link our program in human nutrition to our emerging program in functional foods and to research programs in value-added aspects of food science.

Expenditures for Goal 3: \$704, 679.45

### **Key theme - human nutrition**

Foods high in antioxidants can reduce the risk of cancer, heart disease and certain age related degenerative diseases. Spinach is high in lutein and other antioxidants. Arkansas breeders have identified spinach cultivars with the highest reported levels of lutein and have demonstrated that levels can be enhanced by selective breeding for this trait.

Impact - Production of spinach cultivars with high levels of lutein can help reduce the health care costs by reducing the incidence of certain cancers and other diseases.

Source of federal funds - Hatch, IFAFS, state matching

Scope of impact - Multistate research. Arkansas and Texas scientists have a joint program in spinach variety development and production related research.

### **Key theme - nutraceuticals**

Using biotechnology, plants can be used as biological factories to produce human or animal medicines more safely and less expensively than traditional methods. Experiment station scientists have partnered with the University of Arkansas medical school in a collaborative effort to produce vaccines and other medicines in plant systems.

Impact - Station scientists have introduced genes for medically useful compounds into plants.

Source of federal funds - Hatch, state matching, NSF

Scope of impact - state specific

## **Goal 4. Greater harmony between agriculture and the environment**

As the natural state, Arkansas has abundant natural resources and outdoor recreation is important to residents and tourists. Intensive crop and animal agriculture make it imperative that plant and animal production systems have minimal impact on our natural resources. In our row crop areas soil quality and water availability remain critical issues. A number of our most productive rice producing areas have been designated as critical water use areas and salinity is becoming an increasingly common problem. Multi-disciplinary research, extension teams have been working with farmers to address

problems over the short term but a coordinated long term effort is needed. Research partnerships are emerging with neighboring states to address these issues in a coordinated fashion.

The size of the poultry industry in Arkansas has made waste management an issue to ensure that our water resources are protected. Multi-disciplinary research, extension teams have addressed the phosphorus issue related to poultry litter. Long term test sites have been established to address phosphorus runoff that will establish a research base for voluntary monitoring and mitigation in collaboration with the industry and producers.

Expenditures for Goal 4: \$6,054,557.55

### **Key theme - agricultural waste management**

Phosphorus runoff from animal waste used a fertilizer can contribute to deterioration of water quality if not managed properly. Determination of threshold values can be used to predict potential runoff under defined conditions. Station scientists have developed a portable rainfall simulator that can be used to develop soil test phosphorus values much more quickly than previous methods.

Impact - The portable rainfall simulator increases the ability to assess potential phosphorus runoff under local conditions and is being used regionally to determine phosphorus threshold values.

Source of federal funds - Hatch, state matching

Scope of impact - multistate research and extension

### **Key theme - biological control**

A parasitic wasp imported from Australia lays eggs in the pupa of budworms and bollworms, major pests of cotton. Arkansas scientists have released the wasp in cotton growing areas and are monitoring establishment of the wasp. Wasp populations have become established and are surviving.

Impact - the parasitic wasp can reduce populations of bollworm and budworm by up to 20% and could significantly reduce pesticide applications needed for these pests.

Source of federal funds - Hatch, regional IPM grants program

Scope of impact - multistate research with GA and OK

### **Key theme - integrated pest management**

A peach IPM program has been established and is in use by Arkansas peach producers. A weekly newsletter and web site keeps farmers posted on pest populations and updates them on new research based recommendations.

Impact - Growers utilizing the program have reduced pesticide use by up to 50%. Use has increased from an initial four acres to over 200 acres annually.

Source of federal funds - Hatch, state matching, regional IPM grants program

Scope of impact - multistate research and extension in AR, OK

### **Key theme - soil quality**

Numerous oil contaminated sites exist nationally that require cleanup. Current methods require removing contaminated soils from the site. Arkansas scientists have identified plant species that effectively remove oil from contaminated soils at considerably less cost than other methods.

Impact - Use of plants to remove oil contamination from soil can reduce the expense of cleanup from as much as \$150 per cubic yard to less than \$2.

Source of federal funds - Hatch, state matching

Scope of impact - state specific

### **Key theme - water quality**

Pesticides essential for crop production have the potential to contaminate surface waters. Monitoring of surface waters is needed to assure that water quality is maintained under current production practices. Station scientists have monitored surface waters for several years in the major rice producing areas of the state. Despite detecting small amounts of commonly used pesticides, none have exceeded water quality standards.

Impact - Continual monitoring of surface waters for pesticides ensures that current production systems are not adversely affecting water quality.

Source of federal funds - Hatch, state matching

Scope of impact - state specific

## **Goal 5. Enhanced economic opportunity and quality of life for Americans**

Arkansas remains as a rural state with a low average annual income nationally. Although several areas of the state are undergoing dramatic growth, many rural areas are dealing

with declining populations, limited job opportunities and declining community services such as health care. The aging population creates particular problems in rural areas where access to quality health care and other services are limited. Multi-disciplinary research, extension programs have addressed many of these issues and have provided information to local communities and to policy makers as they work to address some of these endemic, complex problems. Through program redirection additional capacity is being added in human studies to help address research needs in these areas. The program in rural sociology has been moved into the School of Human Environmental Studies to broaden the human studies program by adding a community studies component.

Expenditures for Goal 5: \$1,625,065.40

### **Key theme- child care**

Ensuring that children receive quality child care is an important consideration for many parents. Caregivers frequently have little training in selecting appropriate activities that promote physical, social and emotional development. Arkansas childcare professionals have developed training materials for the Arkansas Department of Human Services that are provided to caregivers throughout the state.

Impact - Training materials are now provided statewide that contain tested activities for use by child care workers that improve the quality of care.

Source of federal funds - Hatch, state matching

Scope of impact - state specific

### **Key theme - community development**

Many small businesses find it difficult to determine their export capability or how to enter the export market. The Global Marketing Support Services was formed to assist small firms with training, consulting, and marketing research. More than 60 firms have received assistance and several have established expert markets for their products or services.

Impact - This program has resulted in job growth in Arkansas through the development of export markets for small businesses. This job growth has contributed to enhancing the quality of life in several small communities throughout the state.

Source of federal funds - Special grants program, state matching funds

Scope of impact - state specific

### **Key theme - conflict management**

Decision making about the management of natural resources is increasingly controversial.

People in the affected communities often feel excluded from the process. Several projects have focused on linking community development with the planning process for public lands. Conflict management at the community level has been a major component of these efforts.

Impact - Results from this study are being used nationally by the Forest Service as a basis for consultation with local communities.

Source of federal funds - NRI, Forest Service, state matching

Scope of impact - multistate research and extension, AR, OK, MS

### **Key theme - impact of change on rural communities**

Many rural communities are seeking to attract retirees as an economic development strategy. Arkansas researchers have completed an extensive survey and focus groups with retirees, community leaders and service providers to explore retirees service needs, and expectations in these communities. This information can be used by local communities to better plan for attracting retirees and to anticipate challenges to development.

Impact - This research will better prepare communities seeking to attract retirees to address their specific service needs and desires.

Source of federal funds - NRI, state matching

Scope of impact - state specific

### **Stakeholder Input Process**

Our stakeholder input process has not changed significantly from that described in our state plan of work. We continue to use formal and informal means to seek input from all stakeholder groups. For farm related stakeholders, public comments are solicited at county meetings and from farm related associations. Each year research and extension scientists meet with administration to discuss producer needs solicited at meetings throughout the year. Identified needs are integrated into the research planning process to ensure program relevance.

Several priority setting activities are scheduled each year with specific commodity or stakeholder groups to seek input on the research planning process. Stakeholder representatives serve on most policy setting groups or program reviews to ensure that the public has a voice in the decision making process. Special meetings are held as needed to address major issues impacting any stakeholder group.

Stakeholder input remains vital to ensuring program relevance and each year programs are adjusted to address identified needs.

## **Program Review Process**

There have been no changes in our program review process since submission of our five year plan of work.

### **Success of Multi and Joint Activities**

The Arkansas Agricultural Experiment Station maintains a number of formal and informal mechanisms to ensure multistate, multi-institutional and multidisciplinary collaborations as well as joint research and extension efforts.

Numerous multistate collaborations take place through the regional project system. In addition, Arkansas is part of a number of multistate consortia and direct research collaborations. For example, Arkansas is a member of the multistate animal waste consortium that is addressing animal waste issues and environmental quality on a national basis. Arkansas has been part of the Food Safety Consortium along with Iowa State and Kansas State for over a decade. This research consortium has had a national impact on food safety issues.

All rice producing states collaboratively share rice germplasm and conduct regional evaluations through the rice regional nursery. A formal agreement has been developed that facilitates germplasm exchange yet protects the public investment in these breeding lines. This system has ensured the rapid use of rice genetics throughout the U.S.

Numerous other multistate and multi-institutional research collaborations exist that address regional or common problems. Many of these collaborations have been identified elsewhere in this report such as the fescue toxicosis research program with Missouri, the functional foods program with Oklahoma and Louisiana, and the rice genomics program with USDA.

Multidisciplinary activities have been facilitated through the development of research institutes and centers at the University of Arkansas. These include the Poultry Center of Excellence that includes disciplines such as economics and engineering in addition to poultry scientists and the Institute of Food Science and Engineering that brings together food scientists, engineers, microbiologists and nutritionists to address common problems faced by the food industry. In row crops research, joint research/extension production management teams meet regularly to jointly plan research activities. Often these activities include stakeholder input to ensure program relevance. Single issue meetings are held as needed to address emerging issues and to craft a research plan to promptly address the problem. These activities also serve to ensure close collaboration with extension counterparts.

### **Integrated Research and Extension Activities**

The Arkansas Agricultural Experiment Station ensures integration of research and extension activities through the use of jointly appointed positions and numerous joint program planning activities. Examples of progress for each of the planned program activities are listed that accompany the program activities listed on the included form CSREES-REPT.

For plant and animal production (includes plant and animal production, plant and animal genetic improvement, plant protection, and animal health), joint program planning occurs annually by commodity in addition to specific program planning activities that address specific problems. During this reporting period, research and extension faculty and AES and CES administrators met with the wheat promotion board and cotton support group to address research funding priorities with stakeholders. Research projects were developed to specifically address these needs.

In agricultural economics, research and extension economists meet annually to conduct joint planning. Both research and extension economists are involved in numerous producer meetings to discuss timely issues related to commodity prices, risk management and other issues.

Product development and processing is addressed through the Institute of Food Science and Engineering. Through the institute research and extension scientists collaboratively address both large and small food industry firms.

Food safety is addressed through the Food Safety research center within the Institute of Food Science and Engineering, the Poultry Center of Excellence and the Food Safety Consortium as well as direct collaborations with the food industry. Many issues are addressed by joint research and extension teams in a collaborative effort. Extension food safety scientists are co-located with AES and USDA scientists in the Poultry center.

Human nutrition research was moved to food science to better foster research collaborations with the food science faculty and to better integrate these programs into the Institute of Food Science and Engineering. Better linkages to extension programming in this area is limited by the small number of scientists.

Natural resource conservation is addressed by joint extension and research teams in collaboration with state government. Joint programs exist dealing with animal waste, water quality, soil quality and other issues.

Quality of life and community development are often addressed collaboratively by research and extension teams. The community development effort in natural resource issues and conflict resolution is handled through a jointly appointed position ensuring program integration.

**Appendix C  
Cooperative State Research, Education, and  
Supplement to the Annual Report of  
Multistate Extension Activities and Integrated  
(Attach Brief Summaries)**

**Institution:**  Agricultural

**State:**  Arkansas

**Check one:**   Multistate Extension

Integrated Activities

Integrated Activities

<u>Title of Planned Program/Activity</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>
<u>Plant &amp; Animal Production</u>	<u>547500</u>	<u>563925</u>	<u>580843</u>	<u>598268</u>	<u>616216</u>
<u>Plant &amp; Animal Genetic Improvement</u>	<u>213612</u>	<u>220020</u>	<u>226621</u>	<u>233420</u>	<u>240423</u>
<u>Plant Protection</u>	<u>435951</u>	<u>449030</u>	<u>462501</u>	<u>476376</u>	<u>490667</u>
<u>Animal Health</u>	<u>115800</u>	<u>119274</u>	<u>122852</u>	<u>126538</u>	<u>130334</u>
<u>Agricultural Economics</u>	<u>249957</u>	<u>257456</u>	<u>265180</u>	<u>273135</u>	<u>281329</u>
<u>Product Development and Processing</u>	<u>120644</u>	<u>124263</u>	<u>127991</u>	<u>131831</u>	<u>135786</u>
<u>Food Safety</u>	<u>150565</u>	<u>155082</u>	<u>159734</u>	<u>164526</u>	<u>169462</u>
<u>Human Nutrition</u>	<u>121181</u>	<u>124816</u>	<u>128560</u>	<u>132417</u>	<u>136390</u>
<u>Natural Resource Conservation</u>	<u>215384</u>	<u>221846</u>	<u>228501</u>	<u>235356</u>	<u>242417</u>
<u>Quality of Life and Community Development</u>	<u>147069</u>	<u>151481</u>	<u>156025</u>	<u>160706</u>	<u>165527</u>
<b><u>Total</u></b>	<b><u>2317663</u></b>	<b><u>2387193</u></b>	<b><u>2458808</u></b>	<b><u>2532573</u></b>	<b><u>2608551</u></b>



Director - March 30, 2001

Form CSREES-REPT (2/00)